



## Wall Fired Low NOx CCV<sup>®</sup> & VS III<sup>™</sup> Burners

Utility Experience

- Supplied over 2,300 LNB's

– RILEY boilers	65 units	810 burners
– B&W boilers	33 units	1,215 burners
– FW boilers & others	13 units	300 burners

- Unit capacities

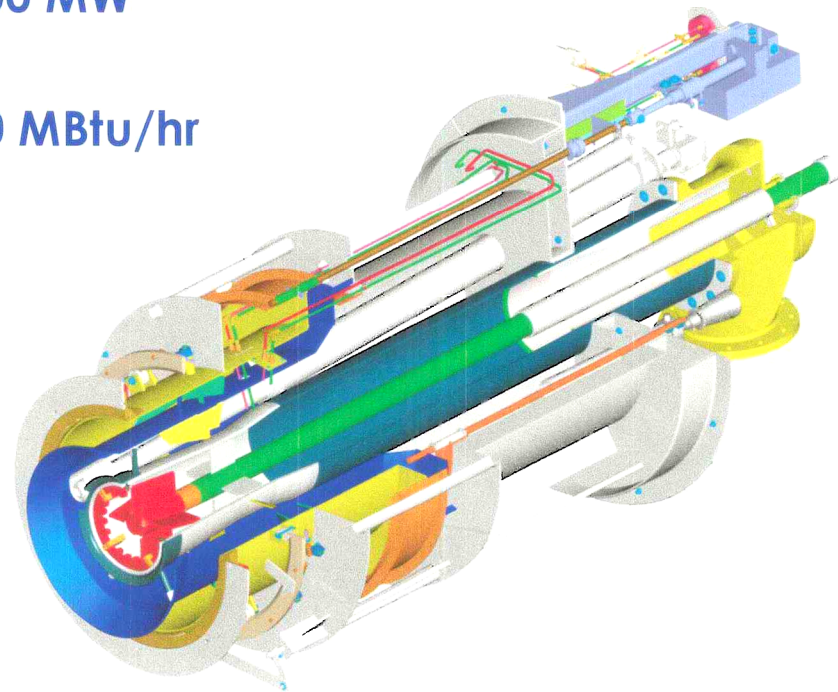
up to 1300 MW

- Burner heat release

up to 260 MBtu/hr

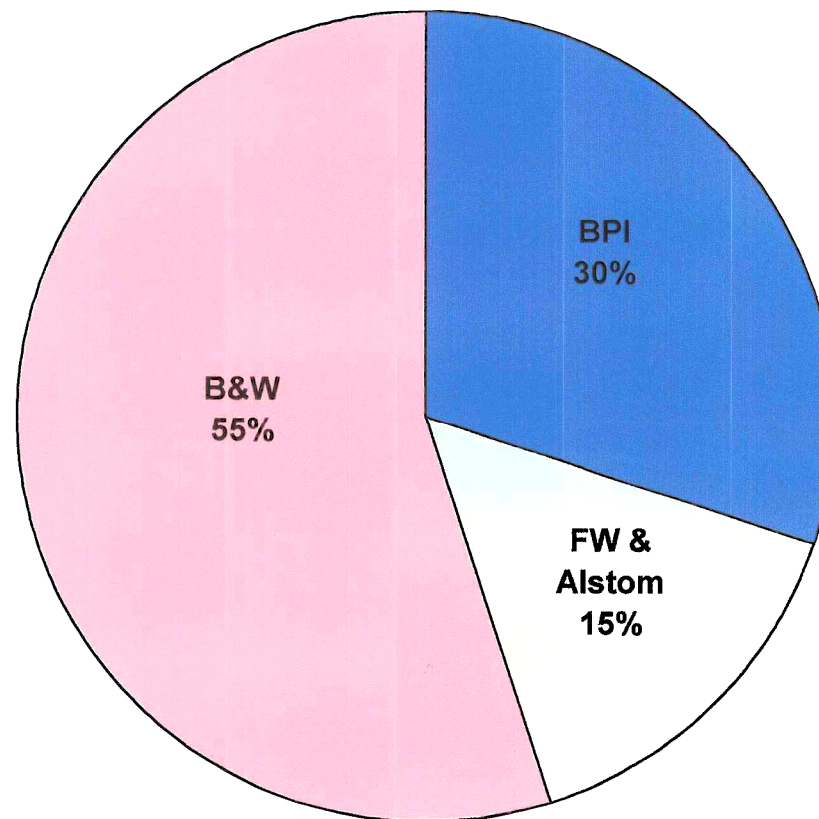
- Coal types

- Lignite
- Sub Bituminous
- PRB
- Bituminous
- Pet. Coke blends





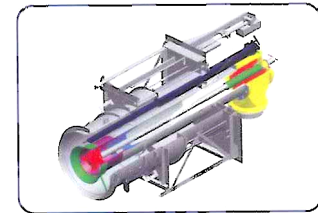
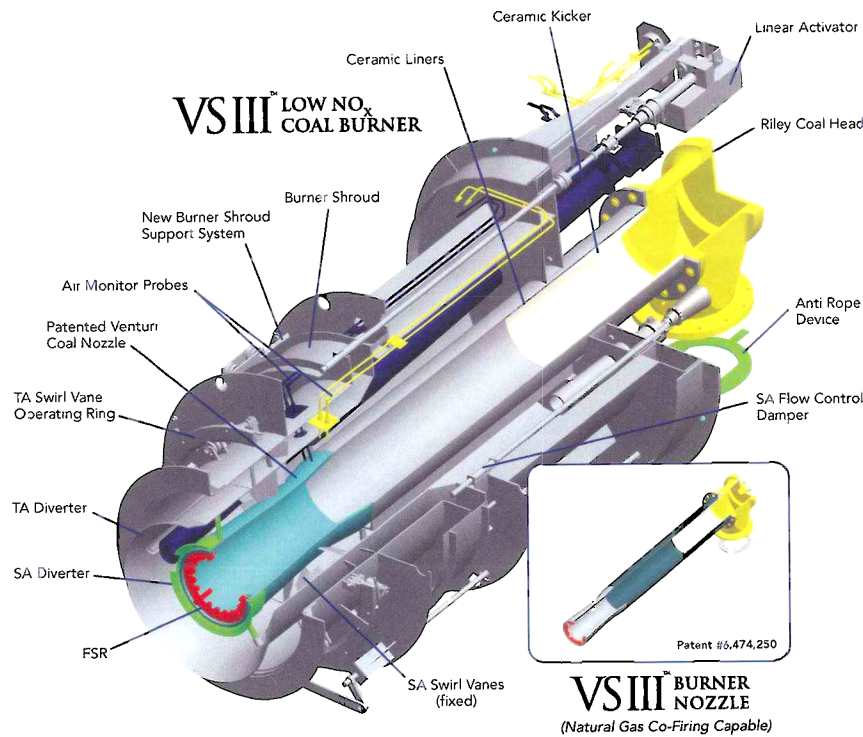
## BPI Low NOx Burner Technology applied to other OEM Installations



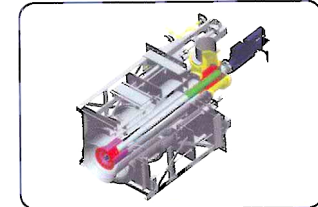
% of Riley LNB's installed on  
OEM boilers



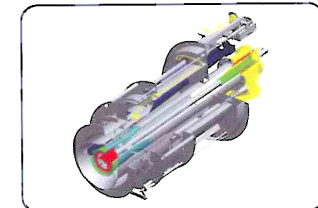
# Low NO<sub>x</sub> Burner Evolution



CCV® SRB – 1st Generation Low NO<sub>x</sub> Burner



CCV® DAZ – 2nd Generation Low NO<sub>x</sub> Burner



CCV® DAZ – Upgraded 2nd Generation Low NO<sub>x</sub> Burner

	CCV® SRB	CCV® DAZ	CCV® DAZ	VSIII™	Benefits of Upgraded Designs
Years Sold:	1985–1998	1999–2003	2003–2009	2010–Present	
<b>CCV® Coal Nozzle</b>					
Fabricated Venturi					
Cast Two-Piece Venturi					
Cast One-Piece Venturi w/CC*					No coal leaks, increased mechanical reliability
Ceramic Protective Tile					Extended operating life of the coal nozzle 2–3 times longer
<b>Flame Stabilizer Ring</b>					
Fabricated FSR – Bolted					The FSR improves the overall flame attachment and reduces NO <sub>x</sub> 10–15% with little to no impact on UBC
Cast FSR – Bolted					
Cast FSR – Integrated					Eliminates potential for bolt failures and loss of segments
Cast FSR – Integrated w/CC*					Extends operating life of the FSR 2–3 times longer
<b>Coal Spreader / Assembly</b>					
No Coal Spreader					Reduces the number of parts exposed to coal erosion to extend operating life. Also lower NO <sub>x</sub>
Fabricated Coal Spreader					
Cast Coal Spreader					Coal spreader controls flame length on front wall-fired units
Cast Coal Spreader w/CC*					Extends operating life of the Coal Spreader 2–3 times longer
<b>Protective Sleeve Assembly</b>					
Protective Sleeve – Steel					
Protective Sleeve – SiCarbide					Extends operating life of the Protective Sleeve 2–3 times longer
Protective Sleeve – Alumina					Extends operating life of the Protective Sleeve 5 times longer
<b>Coal Head Assembly</b>					
Primary Head Vanes					
Anti Rope Device (ARD)					ARD eliminates the requirement for PA Vanes (a wear item) in the coal head. ARD minimizes the coal rope entering the nozzle
<b>Burner Shroud w/Top Carriage</b>					
<b>Burner Shroud w/Side Supports</b>					Side supports provide more operating stability, eliminating potential binding. Knife edge rails easily shed ash to prevent binding. Long term maintenance free operation
<b>Single Air Zone for Low NO<sub>x</sub></b>					
<b>Dual Air Zone for Low NO<sub>x</sub></b>					Reduces NO <sub>x</sub> emissions 15%–20% lower than the Single Air Zone Burner
<b>Formed Stainless Air Diverters</b>					Formed air diverters eliminate critical welds exposed to radiant heat, reducing the potential for failures

NOTE: Nearly all of these design upgrades are available for application to the Single Register Burner (CCV® SRB) and earlier design CCV® DAZ burners.

\*CC=ConformaClad®

Coal Spreaders and Protective Sleeves – Optional to control flame length on those applications where required.